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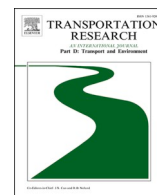
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Curbing the car or charging at the curb?

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ABSTRACT

Do electric vehicles (EVs), and the expansion of curbside charging infrastructure in particular, undermine efforts to reduce vehicle travel? As EVs gain market share, decisionmakers may be less inclined to support policies such as bicycle lanes and reduced parking if they compete for space with EV chargers. We find no evidence, however, of policy substitution. Surveys in Los Angeles indicate that public support for policies to reduce driving is not swayed by the availability of EV charging. Furthermore, interviews in North American cities reveal that local officials are cautious about locking in scarce curbspace for EVs, and universally prioritized curb uses such as bicycle and bus lanes, street trees, and parklets. In our sample of early adopter cities, EV charging is not currently diminishing the political will for policies to reduce driving. However, this caution has slowed the rollout of curbside charging in North America.

1. Introduction

Electric vehicles (EVs), in environmental terms, are normally far superior to their internal combustion counterparts. On a per-mile basis, greenhouse gas emissions are typically 60 to 68% lower in the US (Bieker, 2021), and local air pollution is substantially reduced as well. EVs have thus emerged as a key pillar of climate change policy in cities, states, and countries around the world.

The heaviness of EVs, however, partially counteracts these social benefits. The weight of the battery means that EVs pose greater hazards to other road users, particularly pedestrians and cyclists (Shaffer et al., 2021), and exacerbates non-tailpipe emissions from tire and road wear (Fussell et al., 2022). EVs can also increase vehicle travel—by 10 to 20% in Norway—as each mile driven costs less compared to an internal combustion vehicle, thus compounding externalities such as congestion (Green and Østli, 2025).

In this paper, we focus on a further potential countervailing effect of EV adoption—policy substitution. Greenhouse gas emissions are a function of miles driven and emissions per mile. Policymakers focused on climate mitigation may therefore see electrification (which reduces emissions per mile) and vehicle travel reduction (which reduces miles driven) as substitutes—the more the fleet is electrified, the less the need for policies such as parking restraint, public transportation improvements, and bicycling and walking infrastructure to reduce vehicle travel. Thus, electrification may reduce the willingness of policymakers to allocate funding or take politically fraught decisions in support of vehicle travel reduction.

The competition between EVs and vehicle travel reduction plays out in both academic and policy debates. For example, Horesh and Quinn (2024) conclude that decarbonization strategies should focus on transportation electrification rather than mode shift, because of the greater mitigation potential of the former. Sperling (1996) provides an early example of this line of thinking. Among policymakers, meanwhile, Woodhouse and Mohsin (2023) document how local, state, and federal officials often focus on EVs at the expense of public transportation. Sometimes, the tension between the two approaches is explicit, but more often it surfaces implicitly through a focus on

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EVs and other technological solutions.

The physical space demands of charging infrastructure mean that policies for electrification and vehicle travel reduction may also compete in physical terms. Reduced off-street parking in residential buildings leads to lower car ownership and use (Millard-Ball et al., 2022), but the need for at-home charging provides a new impetus to provide parking. Reducing off-street parking may be at odds with ensuring that residents can easily and cheaply charge their EV at home. On the street, a similar dynamic may ensue: installing curbside chargers may hamper efforts to remove curbside parking for bicycle and bus lanes, ridehail pick-up and drop-off, and parklets.

Many complex areas of policy, from climate policy to economic policy to social policy, are characterized by such a “policy mix” (Cejudo and Michel, 2021). Within this mix, decision makers may see policies as substitutes (Hou and Brewer, 2010), and the choice of specific instruments reflects their risk aversion and blame avoidance (e.g., Howlett, 2014) as well as their relative effectiveness.

The challenge arises when policies within the mix are imperfect substitutes because of differential co-benefits. Electrification and vehicle travel reduction both reduce greenhouse gas emissions and local air pollution, but vehicle travel reduction brings much broader benefits to safety, public health, and equity (e.g., Miner et al., 2024). Thus, substituting electrification for vehicle travel reduction may yield similar greenhouse gas reductions but fewer co-benefits.

In this paper, we examine whether electrification leads to policy substitution, with a particular focus on how this plays out through curb management decisions. We first ask whether electrification affects public support for policies such as removing curbside parking in favor of bicycle lanes, drawing on an online survey and a pedestrian intercept survey in Los Angeles. We then investigate how city staff in 14 North American cities are assessing and navigating the tensions between on-street EV charging and other priorities for the curb, such as protected bicycle lanes and parklets.

2. Curb competition and EVs

2.1. Charging at the curb

The rationale for on-street charging is simple: although most EV owners prefer to charge at home overnight for reasons of cost and convenience (Hardman et al., 2018), installation of chargers is complex or infeasible for renters, residents of multifamily housing, and people without access to off-street parking at home. On-street chargers can fill this gap and make it feasible for many households to purchase an EV. Since low-income households are more likely to rent and live in multifamily housing, on-street charging can be an equity strategy too (Guo and Wang, 2023; Lamm and Johnson, 2024).

While on-street charging is uncommon in most North American cities, it is more prevalent in Europe. In the UK, for example, 32% of the 116,052 public EV chargers were on-street as of January 2026 (DFT, 2026), while Berlin had almost 5,700 on-street chargers in 2025 (City of Berlin, 2025).

Methodologies to plan the siting of electric vehicles chargers abound, and a range of elaborate simulation and optimization models have been developed that account for factors like demand, competition between charging locations, and electrical infrastructure constraints (see Katontoka et al., 2025 for a recent review). Several of these studies specifically analyze the case of on-street charging, considering how limited off-street residential parking may increase demand for curbside charging, as well as factors—neighborhood demographics, nearby points of interest, and local air pollution, for example—that influence optimal charging locations (Grote et al., 2019; Guo and Wang, 2023; Kazempour et al., 2025; Zhang and Kontou, 2025).

2.2. Managing competition at the curb

These studies of optimal locations for on-street chargers, however, gloss over the range of conflicts and competing uses at the curb. In dense urban environments, the curb lane (the parking or travel lane closest to the curb) and the furnishing zone (the part of the sidewalk adjacent to the curb) are in high demand. On-street parking, bus stops, loading and unloading for deliveries, taxis, and ridehail services, bicycle and scooter parking, street trees, nature-based stormwater management, and outdoor seating or dining in the form of parklets are just some of the competing uses. The curb lane may also be requisitioned for a bicycle, bus, or general-purpose traffic lane.

Historically, on-street parking and loading have been the primary concern for management of the curb lane. Limited availability of on-street parking and loading spaces generates congestion and pollution as drivers cruise around in search of a space and creates safety hazards as delivery drivers double park. As a result, cities have long used meters, time limits, permits, and other parking restrictions to regulate the curb. In recent years, on-street parking management has become increasingly sophisticated in a bid to reduce cruising, with cities such as San Francisco and Seattle adjusting meter prices to achieve a target parking occupancy or availability level (e.g., Millard-Ball et al., 2014).

New mobility services have intensified competition for the curb. While taxis have always needed space to pick up and drop off passengers, ridehail services such as Uber and Lyft have grown the market for taxi-like services considerably, increasing demands on the curb (Ranjbari et al., 2021). Ridehail drivers often utilize curbside parking while waiting for their next paid trip (Millard-Ball et al., 2023). Carshare vehicles sometimes benefit from reserved curb parking spaces (Millard-Ball et al., 2005). Micromobility services such as bikeshare and scooters require parking too, which is sometimes accommodated through removing on-street car parking spaces (Brown et al., 2025). The covid-19 pandemic, meanwhile, accelerated trends to replace on-street parking with parklets for outdoor dining (Stevens and Morley, 2024).

In response, some cities have increased their organizational capacity to manage the curb lane and navigate competing uses through creating dedicated curb management teams or task forces (Butrina et al., 2020; Diehl et al., 2021). Cities have also created curb

management policy guidelines to address parking and loading and the role of technology; some of these guidelines cover cycling and outdoor dining as well (Gregg and Maisel, 2025). “What is uniform among the policies [in the 24 cities studied] however, is rethinking the use for the curb beyond parking and the desire to optimize these expanding curb uses” (Gregg and Maisel, 2025, p. 204).

Technological solutions are another common response by cities. Palacios-Argüello et al. (2025) document numerous pilot schemes to manage curbside deliveries through real-time information, reservations, or apps. Cities are also seeking more data about curb occupancy and utilization, and digitizing curb regulations to facilitate information sharing and technology development (Butrina et al., 2020; Diehl et al., 2021).

It would be a mistake, however, to see management of the curb lane as a purely technical exercise. Removal of on-street parking for bicycle lanes is politically charged (Arancibia et al., 2019) and parklets have generated conflicts between residents and business owners rooted in different values about the appropriate use of street space (Stevens and Morley, 2024). The interviews with city staff by Diehl et al. (2021, p. 1423) elicit such descriptions of the curb management process as “...disjointed, decentralized, ad hoc, reactive, complaint-based, and replete with competing interests and tension.” More broadly, Marsden et al. (2020, p.3) highlight the importance of governance: “We see curb use as a negotiated process whereby vested interests seek to establish their right to reconfigure the curb through the formal and informal codification of curb regulation”.

On-street charging for electric vehicles adds a further layer of complexity and competition for curb management. The conflicts are certainly recognized by many cities who are implementing such charging programs (Lamm and Johnson 2014), and 10 of the 24 curb management policies reviewed by Gregg and Maisel (2025) cover EV charging, albeit in little detail. A report from the US federal Joint Office of Energy and Transportation (2024, p. 10) also warns of the dangers of lock in: “A unique challenge and point of contention for curbside charging is that there are many competing uses for curbspace, such as loading zones, outdoor dining, and bus and bike lanes. Because installing permanent EV chargers can lock in curb use, city and town leaders should carefully consider how different uses for the curb interact in the present and in the desired future”.

2.3. Research design and methods

In this study, we examine how city staff, elected officials, and the broader public view and resolve conflicts between curbside EV charging and competing uses for street right-of-way. Our research design consists of two quantitative surveys—a countywide and a pedestrian intercept survey—in Los Angeles, California, and qualitative interviews with municipal staff working on curbside charging in North America. The surveys were designed to elicit how public attitudes to transportation policy, including the allocation of curbspace, may be affected by the availability of electric vehicles. The interviews aimed to understand how frontline staff are navigating any tensions and tradeoffs between electric vehicle charging and other transportation priorities. The surveys focus on policy substitution in broad terms, while the interviews examine policy substitution through the specific lens of curb management.

2.4. Countywide survey

We fielded an online survey of residents of Los Angeles County, California, from June 24, 2024 through July 21, 2024. We used an online panel from a specialist survey firm and received 1123 responses. The primary purpose of the survey was to model EV purchase and charging decisions (as reported in Liu, 2025), but one set of questions asked about attitudes to the following transportation policies:

- Cities should create lanes for buses and bicycles, even if that takes away some street parking spaces
- California should improve public transit to give people alternatives to driving
- California should subsidize the cost of electric vehicles
- We all need to drive less so that we can meet our climate goals
- Cities should build new housing on parking lots, even if that means the parking is lost

We used a Likert scale: for each statement, respondents could choose Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, or Strongly Disagree. We also asked various demographic and transportation-related questions such as gender, race and ethnicity, household size, car and EV ownership, and frequency of driving.

We examine the correlation between attitudes to different policies, and also compare the responses of respondents who own an EV to those who do not. Policy substitution would imply that (i) support for subsidizing EVs is negatively correlated with support for other policies, and (ii) EV owners are more likely to support EV subsidies and less likely to support other policies. Our interest is not in the general attitudes of EV owners, but in ownership as a proxy for how the availability and salience of EVs affect support for different policies.

2.5. Pedestrian intercept survey

We conducted pedestrian intercept surveys at public, surface parking lots in the West Los Angeles and Brentwood neighborhoods of Los Angeles, and in the adjacent city of Santa Monica. We chose the survey sites to offer paired comparisons between similar sites with and without EV chargers. Each neighborhood had at least one site with an EV charger directly visible from the sidewalk where the surveys were conducted, and one without. Within two of the neighborhoods, the EV and non-EV sites are within one block of each other; the Santa Monica sites are ~ 2 miles apart but both are adjacent to farmers markets. A total of 146 responses were collected, 91

from EV charging sites, and 55 from non-EV charging sites (Table 1). The Appendix provides the survey instrument.

While our surveys are not representative of the population, that is not our objective. Rather, our purpose here is to contrast the responses at EV charging and comparable non-EV charging locations. Policy substitution would imply that support for policies to reduce vehicle travel are lower at sites with an EV charger, where the potential for policy substitution between vehicle travel reduction and electrification is made more salient to the respondents.

2.6. Interviews

We interviewed 14 staff at 12 cities with curbside EV charging programs in North America. Some of these programs have been well-established for over ten years, while others are at the beginning phases of implementing their curbside chargers. Curbside charging is uncommon in North America, and so we sought to identify all cities with such a program. We generated an initial list of 16 cities through web and literature searches, and added two further cities based on a snowball process through suggestions from our interviewees. We contacted staff at all 18 cities, and interviewed 14 staff from the 12 cities that agreed to participate. The participating cities were Berkeley (CA), Boston (MA), Burbank (CA), Hoboken (NJ), Los Angeles (CA), Philadelphia (PA), Portland (OR), Sacramento (CA), San Francisco (CA), Santa Monica (CA), Seattle (WA), and Vancouver (BC).

Interviews were conducted virtually over Zoom using a semi-structured interview protocol (see Appendix). Questions asked about the interviewee's role in implementation, city goals with curbside charging, the process used to determine siting of a curbside charger, and the management of conflicts with other demands on curbspace. Interviews typically lasted 30 min, and were recorded and transcribed. We coded the interviews inductively and iteratively to identify the key themes that emerged from the data. An initial analysis was undertaken by one of the authors, with the themes being refined after a second pass by the other author.

Quotations from the interviews are anonymized so that our interviewees could speak freely, but we attribute references to public documents to the specific city.

3. Results

3.1. Countywide survey

The countywide survey reveals positive correlations between the questions on policy attitudes (Fig. 1, Panel A). Rather than any policy substitution effects, the opposite dynamic is evident: greater support for subsidizing EVs is correlated with greater support for vehicle travel reduction policies. The primary driver of support for all the policies may be greenhouse gas reduction in general; respondents do not seem to distinguish between electrification and driving reduction as competing goals.

Similarly, EV owners are more likely to support all of the policies, including those to reduce vehicle travel as well as those to subsidize EVs (Fig. 1, Panel B). A linear regression corroborates these graphical results; the regression controls for a series of demographic and other variables (household size, type of housing, gender identity, education level, age, race and ethnicity, employment status, number of vehicles owned, and frequency of driving). We estimated a series of linear regression models that have the Likert responses as the dependent variable, and that weight the responses to match regional demographics as in Liu, 2025. Coefficients on the binary variable for whether a household owns an EV are positive, indicating that EV owners are more likely to favor all types of policies to reduce greenhouse gas emissions. However, this finding may be a result of an endogenous relationship, given that support for climate policies is likely to spur individuals to purchase an EV).

3.2. Pedestrian intercept survey

The pedestrian intercept survey provides no evidence that individuals reduce their support for vehicle travel reduction policies in the visible presence of EV charging. Responses across all of the questions about attitudes to different policies were very similar at the “treatment” survey sites with EV charging and at the nearby control sites without charging (Fig. 2, left). Likewise, survey respondents at both treatment and control sites had similar policy priorities (Fig. 2, right).

Linear regression analysis yields the same conclusion of “no detectable effect.” Table 2 summarizes the coefficients of interest, i.e., the coefficient on the dummy variable that denotes a treatment site, in a series of linear regression models that have the Likert responses as the dependent variable. In line with Norman (2010), we treat the Likert responses as continuous rather than using a discrete

Table 1
Survey sites for pedestrian intercept survey.

Site	EV charging	Neighborhood	Responses
Butler/Santa Monica	Yes	West Los Angeles	26
Purdue/Santa Monica	No	West Los Angeles	10
Whole Foods	Yes	Brentwood	37
CVS	No	Brentwood	15
Alfred Coffee	No	Brentwood	26
Virginia Avenue Park	Yes	Santa Monica	28
Downtown Farmers Market	No	Santa Monica	4
Total			146

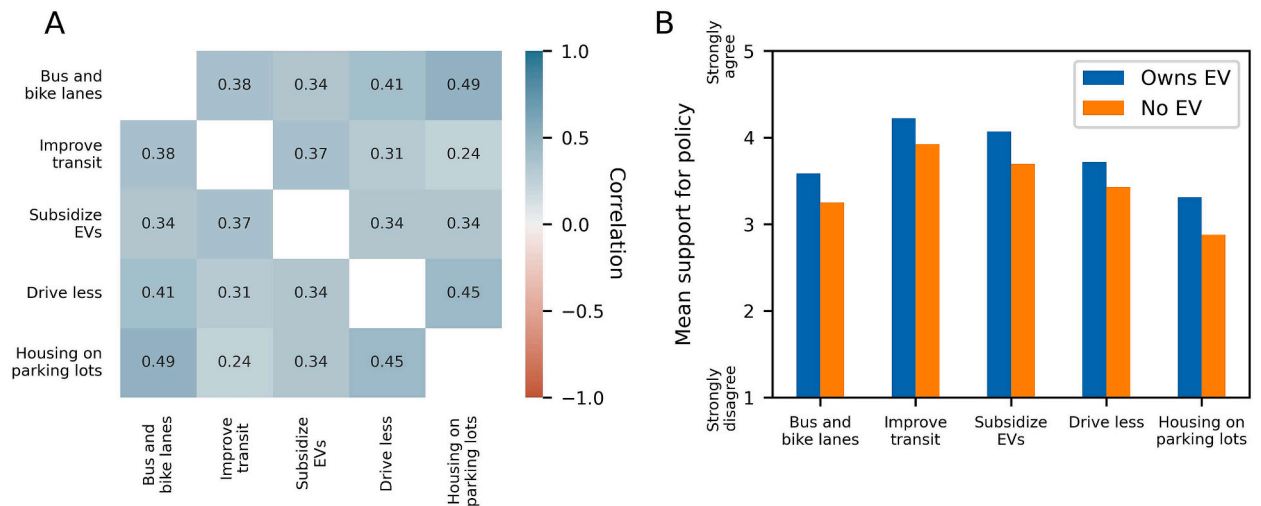


Fig. 1. Countywide survey results. Panel A shows correlations between attitudes to different policies. Panel B shows mean support for each policy, comparing respondents who own an EV with other respondents. The Likert scale is coded from 5 (Strongly Agree) to 1 (Strongly Disagree).

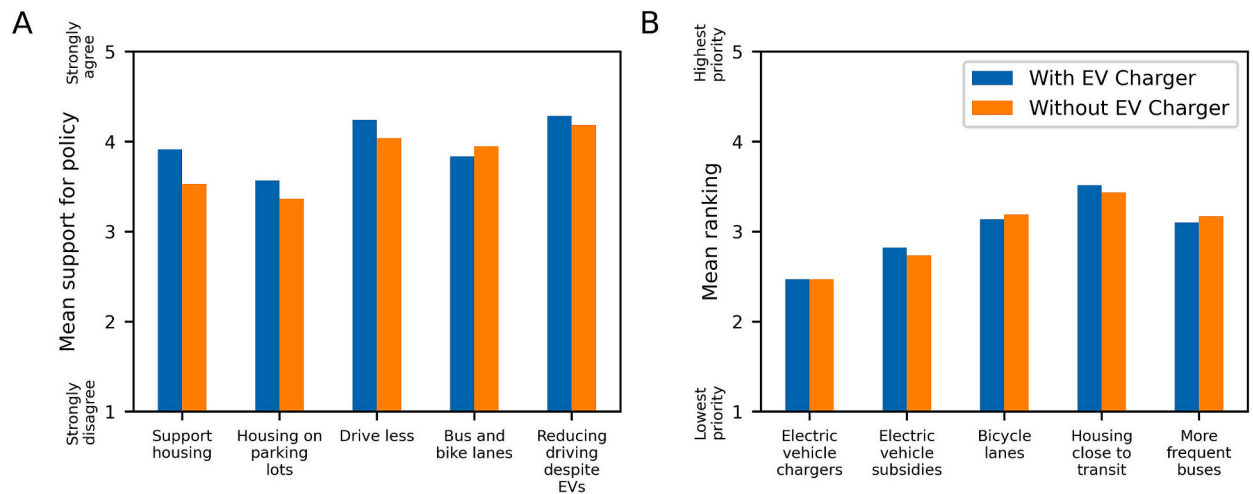


Fig. 2. Pedestrian intercept survey results. Mean Likert-scale responses to policy attitude questions (Panel A, left) and policy priorities (Panel B, right). A higher ranking indicates that the policy is more important.

Table 2

Pedestrian intercept survey regression. The values shown are the coefficients on the binary variable that denotes whether a survey location has EV charging, with standard errors in parentheses. Other coefficients are not shown. The Likert-scale responses are coded from 1 (strongly disagree) to 5 (strongly agree). The “location only” model includes a fixed effect for survey neighborhood. The additional controls are gender, number of vehicles owned, whether the respondent normally commutes by car, and whether the respondent owns an EV or hybrid vehicle.

	Location only	Location + additional controls
Supports more housing	0.321 (0.212)	0.499 (0.255)
Support housing even if surface parking is lost	0.104 (0.223)	0.311 (0.247)
Supports driving less	0.061 (0.186)	0.100 (0.213)
Supports creating bike/bus lanes	−0.141 (0.194)	0.134 (0.208)
Supports reducing driving even with EVs	0.004 (0.168)	0.210 (0.188)
N	146	110

choice model. None of the coefficients are statistically significant at conventional levels. Moreover, almost all are positive, indicating that if anything, the presence of EV chargers increases support for policies such as infill housing and bicycle lanes, even if parking is lost as a result. The results are qualitatively unchanged when demographic and transportation-related covariates are added to the models

(Table 2).

A failure to reject the null hypothesis is not the same as demonstrating that no effect exists. In other words, the lack of statistical significance is not the same as showing the absence of policy substitution. However, the combination of positively signed coefficients (the opposite sign to our hypothesis) and statistical precision (the standard errors in Table 2 are almost all around 0.2) means that any effect, if it exists, would be very small and of little practical importance.

4. Interviews

4.1. Goals for curbside charging

Staff at the cities that we spoke with generally saw curbside charging as a means to support emissions, climate, and other sustainability goals through vehicle electrification, to promote equitable distribution of charging infrastructure, and to ensure coverage throughout the city (for example, with every resident within a five-minute walk of a charger). While the cities were simultaneously pursuing off-street charging—for example, in municipal parking garages or through charging requirements for new residential buildings—they saw curbside charging as an important complement, and as a way to overcome constrained off-street parking and electric power capacity. Many cities, especially denser ones, have limited off-street space in surface lots and garages, making it difficult to distribute chargers across the city unless curbside charging is part of the package. Additionally, some cities noted that the installation of more chargers in public lots or garages would require expensive power system upgrades. A few cities also believed that the installation of curbside chargers brought more visibility to EV infrastructure compared to off-street facilities, and hoped that this greater visibility would induce residents to adopt EVs.

Curbside charging in particular was seen as a solution to equitably distribute EV charging infrastructure across the city. This is because many curbside charging programs prioritized proximity to rental and multifamily dwellings, and/or older buildings that lack the garages that single-family residents use to charge their vehicles.

4.2. Siting processes

The cities we interviewed had a variety of siting processes to select and prioritize locations for curbside EV chargers. Some were formal, some ad hoc, and some driven by public requests or by private EV charging providers. The municipal departments involved in the process also varied across cities. Given that curbside charging is still relatively recent in North America, many cities noted the lack of formal guidance on best practices and the lack of a standardized approach.

We distinguish between two stages of the siting process: (i) development of a list of priority neighborhoods and potential locations, and (ii) the detailed permitting process for specific sites. At the first stage, some cities relied on private charging providers—ChargePoint, Flo, and EVgo, for example—to propose sites, or in the case of Seattle and Berkeley, relied on resident requests. Uniquely, Berkeley's now-discontinued pilot program was limited to residents without off-street parking and required the applicant to fund the installation, often using a conduit to connect the charger to their home's electricity supply.

Other cities managed the process in-house or commissioned staff or consultant reports to identify priority locations (see [Boston Transportation Department, 2023](#); [SFMTA, 2025](#) for examples). One interviewee described this process as “combing through streets within multifamily neighborhoods to see where there's available curbspace”.

Two common prioritization criteria were equity (e.g., low-income neighborhoods and/or communities of color) and a prevalence of buildings likely to lack off-street parking. Cities often explicitly prioritized neighborhoods with multifamily, rental, and/or older properties as staff explained in our interviews:

“We have moved significantly towards just multifamily at this point...That's what we're focusing on. And we're finding that that's where it's most needed.”

“Most people in [our city] don't have access to at-home charging. They don't have driveways. They don't have garages. So it's even more important to have [chargers] convenient to where people live.”

Portland, for example, mapped out priority areas in neighborhoods with commercial and civic amenities and multifamily residential housing, and prioritized historically underserved communities and neighborhoods without existing curbside chargers for new installations. San Francisco used a multicriteria analysis that considered criteria such as equity, current EV adoption and car ownership rates, curb use, off-street parking availability, and vandalism risk. Seattle adopted a points system to give priority to charging locations that would improve equity and attract higher utilization. Points were awarded for requests by for-hire drivers (e.g., Uber or DoorDash) in order to facilitate the electrification of these high-mileage vehicles, for requests from affordable and multifamily housing tenants, and for chargers within 500 feet of retail, offices, and community-serving facilities such as libraries.

At the second stage of reviewing and permitting specific locations, the challenges of managing the curb discussed earlier in this paper came into greater focus, as cities determined where curbside chargers were physically possible and assessed the tradeoffs with other demands on curb and sidewalk space. All of the staff that we interviewed were acutely aware of these tradeoffs, especially in the densest, more urban cities where demands for curbspace are the greatest.

As with the first stage of the siting process, cities' internal processes for approving specific charger locations ranged from formal to ad hoc. At one end of the spectrum, Portland, Berkeley, and San Francisco developed formal standards or guidance documents to assess curbside EV locations. San Francisco's pilot program guidelines prohibit chargers on commercial corridor streets due to the need to retain curbspace for commercial activities, loading, and visitor parking, but allow chargers on adjacent side streets ([City of San](#)

Francisco, 2024). Similarly, Portland's design standards for curbside chargers specify that chargers be located on side streets¹ "around the corner" from main streets and arterials, given the greater demands for right-of-way space on the latter. Portland's standards also preclude chargers on active or planned streetcar lines and specify minimum clearance distances such as 30 feet from bus stops and 5 feet from bikeshare docking stations (PBOT, 2023). Boston, meanwhile, used a points system with additional points awarded to locations that met certain criteria—for example, 30 feet from a transit stop, 10 feet from a tree base, 20 feet from a crosswalk, and not adjacent to a historic district (Boston Transportation Department, 2023). In historic districts, chargers could also be subject to additional aesthetic requirements.

Cities without such formal guidance still tended to have a thorough review process and conducted site visits to identify potential conflicts and ensure that proposed locations did not conflict with other plans. One interviewee in a city where the site selection was driven by private charging providers referred to a "vetting process...we would determine if there were any fatal flaws." Community engagement was sometimes part of these efforts too, in order to minimize pushback and get buy-in from adjacent residents and businesses.

This review process was frequently interdepartmental. Depending on the city, the departments or staff involved in the review process included public works, parking operations, transit, pedestrian and bicycle planning, historic preservation, urban forestry, public landscaping, street lighting, the local utility, water and sewer, permitting, accessibility or disability services, and long-range planning. Cities generally tried hard to site chargers in locations with minimal or no conflicts, and looked ahead to potential future conflicts to lower the risk that a charger would need to be removed or relocated. Said one staff member: "We have traditionally sited our curbside [chargers] adjacent to a park, because that's where we find that the redevelopment risk is a lot lower. The conflicts with potential bike lanes and patios and transit are likely lower as well".

If EV chargers were easily and cheaply moved, such extensive design and review processes might not be warranted. However, most cities saw the chargers as semi-permanent installations that would remain through the chargers' operational lifespans, typically estimated at 10–15 years (e.g., conEdison, 2025; SFMTA, 2025). Most cities opted for pedestals mounted on the sidewalk, which may require trenching and electrical upgrades in addition to the visible charging cabinet hardware, all entailing substantial capital costs. San Francisco, for example, estimates that a standalone charger costs \$23,000 to \$57,000 to install, including trenching and other civil works, conduit, the charging hardware, and soft costs (SFMTA 2025, pp. 24-25).

When we asked one planner about the possibility of removing a charger, they responded that their planning process aims to avoid such a situation arising. "While we have the authority to remove a charger in the right-of-way, or require it to be moved, we're all hoping that is something we never have to do. That's one of the reasons our siting requirements, frankly, are relatively strict compared to other cities. ...We can make the EV charging station move if we really want to put in a bike lane somewhere...[but] we don't want that to happen." Even if the cost of removal or relocation would be borne by the private charging provider, cities may still want to provide some certainty to these private-sector partners.

Curbside chargers that are mounted on streetlight poles are an exception, as they are typically quick to install and remove. In North America, however, Los Angeles is the only city with a large-scale program of this nature. The Los Angeles program was feasible in part because of spare power capacity on streetlights following their conversion to LEDs and the existence of a municipal utility, meaning that transportation, street lighting, and electric power are all run by the city, making coordination easier. Seattle, which also has a municipally owned utility, has successfully mounted chargers on utility poles. Although a transformer is required under the Seattle system (unlike the streetlight chargers), there are no costs for trenching, and vandalism, theft, and tripping hazards are minimized because the cords are raised off the ground. Other cities have looked towards this model but have been unable to implement it because of lack of power capacity on streetlights, photovoltaic lights where no power is available during daylight hours, lack of municipal ownership of streetlights, or inability to come to an agreement with utility companies on permits or financing.

4.3. Curbside conflicts

Staff we interviewed identified numerous types of curbside conflicts that would preclude the installation of EV chargers. Here, we discuss the most substantial conflicts and how the cities we spoke with have avoided them.

Bike lanes. Sometimes, striping a new bike lane may require the complete removal of curbside parking (and associated EV charging) due to limited right-of-way. In all cities that we spoke with, parking-protected bike lanes precluded curbside EV charging altogether, in order to avoid bicycles traveling between parked cars and any curbside charging equipment. One interviewee said: "If somebody doesn't put the cord back correctly, you could have the cord draping across that protected bike lane. That's something that I flag." Another interviewee from an east coast city referred to a widely publicized Reddit post picturing a charging cable strung at waist height across a protected bike lane in downtown Los Angeles.² San Francisco's Curbside Charging feasibility study notes: "As the curbside network is advanced it will need to avoid placing chargers on curbs identified as future separated bike facilities, or with the awareness that access to the chargers may be eliminated when future projects are implemented on those corridors" (SFMTA, 2025, p. 18).

Some cities also excluded streets with conventional, unprotected bike lanes from EV charging, partly in order to retain the option to upgrade to parking-protected lanes in the future. Philadelphia's 2024 Request for Proposals for private charging providers, for example, precluded chargers from all streets on its planned High Quality Bike Network which includes unprotected lanes on

¹ Formally, the side streets are those classified as Local Service Traffic Streets.

² See https://www.reddit.com/r/CrappyDesign/comments/iggufq/car_charger_crosses_the_new_bike_lanes_in_dtla/.

neighborhood streets as well as separated facilities and trails. In one city, transportation department staff reviewed potential charging locations to identify conflicts with possible future bike lanes, only some of which might be in an adopted bicycle plan. In another, staff told us: “Our private partners are posing locations in absolutely wild places, and we’re telling them, ‘No, you can’t do this’. They are pushy about getting locations approved in these places. But I will flag any bike lane especially”.

Unprotected bike lanes did not always categorically preclude curbside charging, however, with one city evaluating these sites on a case-by-case basis. “It’s not like we’re passing up on sites just because there’s a bike lane or a planned bike lane,” said our interviewee. “It’s a balance, because the actual charge port doesn’t protrude all that far from the vehicle and people are getting in and out of their vehicles anyways. But maybe if we were debating between two locations and one had an adjacent bike lane and one didn’t, we would go for the one that didn’t”.

Bus routes. Cities tended to avoid bus routes when siting chargers, especially on streets with dedicated bus lanes where chargers might lead to double parking. “We don’t want people queuing [for an EV charger] in bus lanes,” said one staff member. However, in some cases, staff were willing to consider how chargers and bus routes could coexist. For example, one city even petitioned the transit agency to get the bus stop shortened, which created space for the charger to be installed adjacent to the bus stop.

Loading zones. Most cities avoided installing EV chargers in commercial loading zones and in passenger pick-up and drop-off zones. One city was even cautious of siting in front of businesses with potential loading needs, regardless of whether a formal loading zone existed.

Street trees. Beyond the obvious conflicts above the surface between charging pedestals and trees, staff we interviewed highlighted the impacts of chargers and associated trenching on root systems. But street trees could also expose disagreements between staff in different departments about the appropriate use of street right-of-way. In one city, while staff from across departments eventually agreed that “EV chargers and street trees...can coexist,” urban forestry staff initially saw the EV chargers as substituting for a potential tree, according to our interviewee. “Anywhere you put an EV charger, that’s somewhere a street tree is not going”.

Cities vary in how stringently they address these conflicts — some avoid blocks with street trees altogether, while others specify minimum clearances. Sacramento, for example, designates the area under the canopy of each street tree as a tree protection zone and requires any pruning or excavation within that zone to be directly supervised by a certified arborist and approved by the City Urban Forester. In Portland, installers are required to contact the City Forester if there may be conflicts with trees or root systems. Transportation staff often worked with public landscaping or urban forestry departments to navigate the siting process or to trim roots or tree appendages to make it possible for a charger to be sited alongside it.

Meters. In principle, there is no obstacle to installing EV chargers in metered spots. Users could simply pay the meter fee in addition to the charging fee. In practice, however, the presence of meters may signal to non-EV drivers that they can use the parking space and prevent the use of the charger (see Fig. 3 for an example from Los Angeles). City staff were also reluctant to bear the revenue loss (up to \$10,000 per year for a high-utilization downtown space, according to one city) if the meters were removed or EVs were exempted from the meter charges, or to impose dual fees (charging fee plus parking fee) that would be “confusing and complicated for the end user”.

One city staff member that we interviewed pointed to a gap in policy: “We’re trying to stay away from metered blocks right now because we haven’t addressed that gap in policy of how someone would pay for a meter and pay for charging.” Another cited institutional complexities: “Who would pay who? How would the payment [method be] for the charger because you pay to charge your vehicle? How would money go from one department to the other department for the lost revenue if we pull the meter out?”.

Parklets convert on-street parking into seating or outdoor dining areas, effectively expanding the sidewalk into the former parking

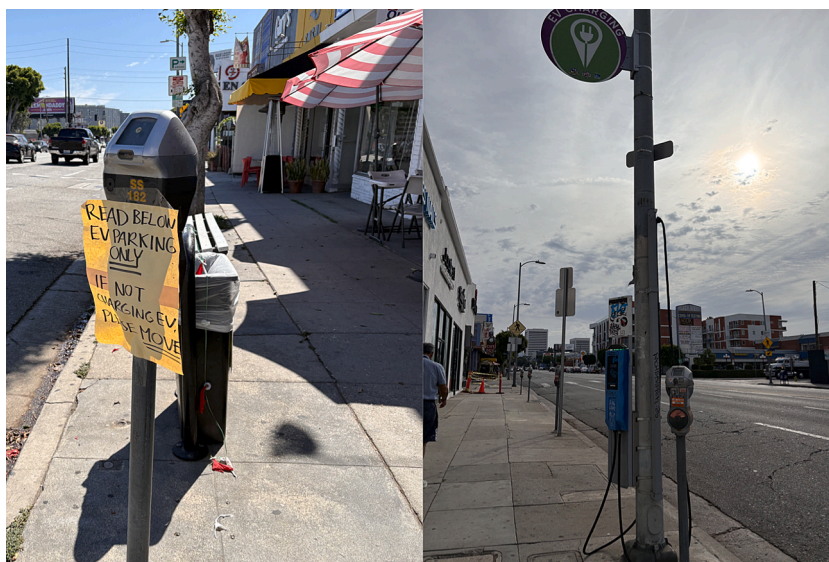


Fig. 3. Conflicts between metered parking and EV charging, Los Angeles. A hand-written sign, presumably placed by a frustrated EV owner, states: “Read below. EV Parking Only. If not charging EV please Move.” The street light-mounted charger is shown to the right. Photos: Jasmine Law.

lane. Thus, parking removal makes parklets incompatible with curbside EV charging. While most cities did not formally consider potential parklets when siting EV chargers, one avoids curb spaces outside restaurants altogether. “We try not to put them in front of a restaurant, because we think that a restaurant might someday want to use that space as a parklet,” explained our interviewee.

Power. Even without considering competing uses for curbspace, power availability was a limiting factor that could preclude otherwise-suitable locations. Pedestal-mounted chargers typically necessitate trenching for conduit to the nearest power line, and longer trenches entail additional costs. Power was commonly noted to be a significant limiter in implementing curbside charging, and could also limit the number of chargers on a given block. Space for pedestals can be a constraint too: sometimes, sidewalks are too narrow to allow for a pedestal to be installed while retaining ADA-mandated minimum sidewalk clearances.

5. Discussion and conclusions

Decarbonization in the transportation sector is often analyzed as a “three-legged” stool of lower-carbon fuels, increased vehicle efficiency, and reduced vehicle travel (Ewing et al., 2008). Other frameworks such as Avoid-Shift-Improve and ASIF (Schipper et al., 2000; Bakker et al., 2014) offer a conceptually similar disaggregation of climate policies. Such frameworks, however, portray electrification and vehicle travel reduction as inherently complementary, without considering how they may substitute for one another.

In this paper, we find little to no evidence for the policy substitution that might be expected from theories of the policy process. Our surveys indicate that public opinion on policies to reduce driving, such as bicycle lanes and infill development on parking lots, is not swayed by the availability or salience of EV charging. Local officials, meanwhile, are acutely aware of conflicts between curbside EV chargers and other demands for street right-of-way, and those we spoke with universally prioritized bicycle and bus lanes, street trees, parklets, and similar curb uses over EV chargers. San Francisco’s curb management strategy warns: “On-street charging stations require significant capital investment and lock curbspace into a single use, which poses an obstacle to future streetscape changes” (SFMTA, 2020, p. 83).

Some cities took an absolutist approach, categorically excluding chargers from blocks with existing or potential future bicycle lanes, along commercial corridors, or close to street trees. Others sought to avoid the conflicts through restricting chargers to side streets “around the corner” from a commercial street or through focusing curbside charging in residential neighborhoods with relatively low demands for on-street parking. Yet other cities relied on judgement and a site-specific determination and were willing to compromise through shortening bus stops or placing chargers on streets with unprotected bike lanes if there was no nearby alternative.

Most of the staff we spoke with saw EV charging as one more demand on the public right-of-way, and were thus cautious about rapidly expanding charging infrastructure that might lock in valuable curbspace for charging, or reduce their flexibility to respond to changing demands on the right-of-way. Fears of privatizing the street through granting exclusive access to adjacent homeowners was another concern. “People figured out that the cheapest way to get your own parking spot in really dense residential neighborhoods was to get an EV, or even a plug-in hybrid,” said one staff member.

This municipal caution has meant that curbside charging has rolled out very slowly in North America. The cities we spoke with had typically installed just a handful of chargers. The numbers were especially low in places such as Berkeley that expected the residents or businesses that requested the charger to pay for its installation: Berkeley had installed a total of seven before it sunset its on-street pilot program. Cities often focused instead on off-street municipal locations—sometimes because of a move towards Level 3 fast chargers whose power demands are harder to accommodate with curbside infrastructure, and sometimes because of simplicity. “Off-street is absolutely the easiest in terms of avoiding all those on-street conflicts,” one city told us.

The notable exceptions with a large curbside program (Los Angeles and Seattle) have pioneered a lower-cost method of mounting chargers on street lighting or utility poles, meaning that the hardware is cheaper and quicker to install compared to the more typical installation methods that require trenching, pedestals, and new utility service interconnections. These two cities also have municipally owned utilities, making coordination easier. Many of the other cities we spoke with had tried to work with utility companies to implement a similar scheme, but with little success to date.

While cities have been cautious in rolling out curbside charging, private charging providers have been eager to expand, indicating that market demand is there. “They’re very pushy,” said one staff member. “They want to maximize as many chargers as they can in the city, and they think that this is their playground.” Hoboken’s data show that on-street charging stations are being much better used than those off-street, and that the spaces are being used more intensively as well. On-street charging spaces see 3.5 “interactions” (i.e., charging sessions) per space per day—nearly twice as many as paid parking and nearly nine times more than resident-only permit parking (City of Hoboken, 2025).

Overall, EV charging has added additional competition for scarce curbspace. However, cities have generally handled it via the existing curb management frameworks discussed in the literature review, whether through formal guidelines or via the “negotiated process” described by Marsden et al. (2020), involving private charging providers and multiple internal stakeholders.

Moreover, cities have slotted EV charging towards the bottom of their implicit or unwritten hierarchy of priorities for curbspace and for transportation policy as a whole. “The reason why we didn’t put more effort into [curbside charging] earlier is because we really are focused on getting more people walking, biking and using transit,” explained one staff member. Berkeley’s Electric Mobility Roadmap identified a priority order of transportation modes, with walking, wheelchair use, and biking at the top, electric private vehicles in second-to-last place, and (non-electric) private vehicles at the bottom (City of Berkeley, 2020). “This is an inherently political discussion—how we use the public right-of-way,” an interviewee told us.

In large part, our findings may reflect the nature of cities that have pursued curbside charging. Most places in North America have ample off-street parking where EV chargers can be accommodated, meaning that curbside chargers are less of a necessity. The cities where curbside charging is the only option for many residents tend to be older, denser, and more walkable, and to have strong policy

and staff commitments to active transportation, public transit, parking reform, and curbspace management. For example, San Francisco, Seattle, Berkeley, and Los Angeles were among the first to implement demand-responsive meter pricing, and it is perhaps no surprise that they are also some of the early adopters of another innovative program, curbside charging.

Thus, in the cities we studied, a shared vision among staff and the adoption of plans and policies to prioritize walking, cycling, and public transportation have been a bulwark against any policy substitution: EVs have not demonstrably weakened these cities' efforts to reduce vehicle travel. The cities we studied aimed to promote EVs, but did not see electrification as a substitute for vehicle travel reduction, and the fears of "lock in" discussed earlier in this paper have not materialized. But it is unlikely that we would uncover policy substitution in more automobile-focused cities either, because in those cities, there is less competition for curbspace or street right-of-way.

We do not examine other potential avenues for policy substitution, notably through funding: our results do not discount the possibility that funding EV charging may reduce funding available for other transportation policies. And the lower per-mile cost of EVs means that increased adoption is likely to lead to some increased driving. At the curb, however, cities have long-standing frameworks to deal with conflicts and allocate scarce curbspace in dense, urban neighborhoods. While navigating these tensions has slowed the adoption of curbside charging, cities have so far largely ensured that EV chargers have not taken precedence over other priorities for the curb.

CRedit authorship contribution statement

Adam Millard-Ball: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Jasmine Law:** Writing – review & editing, Writing – original draft, Visualization, Investigation, Formal analysis.

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Appendix

Pedestrian intercept survey

Climate Change and Transportation Policies Survey

Time: 3-4 minutes

Thank you for taking the time to fill out this survey about your opinions on housing, climate, and transportation policies!

1. I support more housing to be built in my neighborhood.

- ☐ Strongly Agree
☐ Agree
☐ Neither Agree nor Disagree
☐ Disagree
☐ Strongly Disagree

2. I support that housing, even if that means some surface parking lots will be lost.

- ☐ Strongly Agree
☐ Agree
☐ Neither Agree nor Disagree
☐ Disagree
☐ Strongly Disagree

3. In order to meet its climate goals, California provides incentives for electric vehicles. It also aims to reduce the amount that people need to drive. What do you think are the most important policies?

Please rank importance on a scale of 1 to 5, where 1 = most important and 5 = least important

Policies:

- A. Electric Vehicle Chargers
 B. Subsidies for people to buy electric vehicles
 C. More/safer bike lanes
 D. More housing close to public transit
 E. More frequent buses

Ranking:

1. _____(most)
 2. _____
 3. _____
 4. _____
 5. _____(least)

4. We all need to drive less so that we can meet our climate goals.

- ☐ Strongly Agree
☐ Agree
☐ Neither Agree nor Disagree
☐ Disagree
☐ Strongly Disagree

5. Cities should create lanes for buses and bicycles, even if that takes away some street parking.

- ☐ Strongly Agree
☐ Agree
☐ Neither Agree nor Disagree
☐ Disagree
☐ Strongly Disagree

Fig. A-1. Intercept survey instrument

Climate Change and Transportation Policies Survey

Time: 3-4 minutes

6. Many people now have electric cars. But for climate change, it's still important to reduce the amount we all drive.

- ☐ Strongly Agree
☐ Agree
☐ Neither Agree nor Disagree
☐ Disagree
☐ Strongly Disagree

Demographic Questions

7. How do you usually get to work or school?

- | | |
|--|--|
| ☐ Drive | ☐ I work from home |
| ☐ Take the bus or train | ☐ I'm not currently employed or in school |
| ☐ Walk | ☐ Other |
| ☐ Bike | |

8. How many cars do you and your household own? _____

9. Do you drive an electric vehicle?

- ☐ Yes, full electric ☐ Yes, hybrid ☐ No

10. What is your home zip code? _____

11. What gender do you identify as?

- ☐ Man ☐ Woman ☐ Non-binary ☐ Something else
☐ Prefer not to say

For Surveyor to Fill out:

Survey location: _____ Date: _____

Time: _____ Surveyor name: _____

Fig. A-1. (continued).

Interview Questions

Tell us about your role in planning and implementing curbside charging in [CITY NAME]

How did the city's curbside charging program come about? What was the impetus?

What are the city's main goals with curbside charging?

Follow ups:

What market do these chargers serve?

What's the overall goal?

Tell us about the siting process. How do you decide where to install curbside chargers? What criteria do you use, and what's the process?

Follow ups:

Role of requests from residents or business owners

Which staff / departments review requests?

How are locations prioritized?

To what extent are other plans (e.g. road repaving/maintenance, bike plans) considered?

Are there locations where you would NOT install curbside chargers?

What happens if a charger needs to be removed—for example, if the street is redesigned, or for construction or road maintenance?

Does the city have financial or other obligations to the provider?

Has removal ever happened?

Do you have a sample contract or MOU with the charging provider that you can share with us? Or are there any other published workplans or procedures that you'd be able to share?

What's next for your curbside charging program?

Who else should we talk to – especially at other cities that may be pursuing similar programs?

Anything else that you'd like to share?

Data availability

The data that has been used is confidential.

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